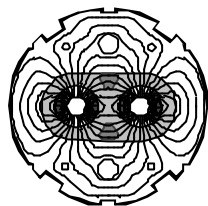


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the
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project

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Interface Specification

INNER TRIPLET CORRECTOR MQSXA

Abstract

MQSXA corrector packages are mated with MQXA quadrupoles in the LMQXC assemblies. This specification codifies the envelope and attachments that constrain the MQSXA deliverable such that the attachment can be completed.

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History of Changes

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0.1	2002-03-21	All	Submitted.
	2002-04-15	All	Submission for approval.
1.0	2002-08-19	4	Change the spelling "octopole" to "octupole".
	2002-08-28	All	Released Version

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1. INTRODUCTION

Each inner triplet of LHC [1] is assembled from a set of components, including the main quadrupole elements MQXA and MQXB, and corrector elements MCBX, MCBXA, and MQSXA (figure 1). The MCBX, MCBXA and MQSXA corrector packages are incorporated into the LMQX helium vessels, and operate in a 1.9K helium bath which surrounds the corrector and is contained by a separate cylinder.

The MQSXA assembly [2] includes the skew quadrupole corrector winding (MQSX), and 3 higher order correctors – skew sextupole (MCSSX), normal octupole (MCOX), and skew octupole (MCOSX).

The correctors are procured by CERN, and delivered fully tested to Fermilab for final assembly with the main quadrupoles.

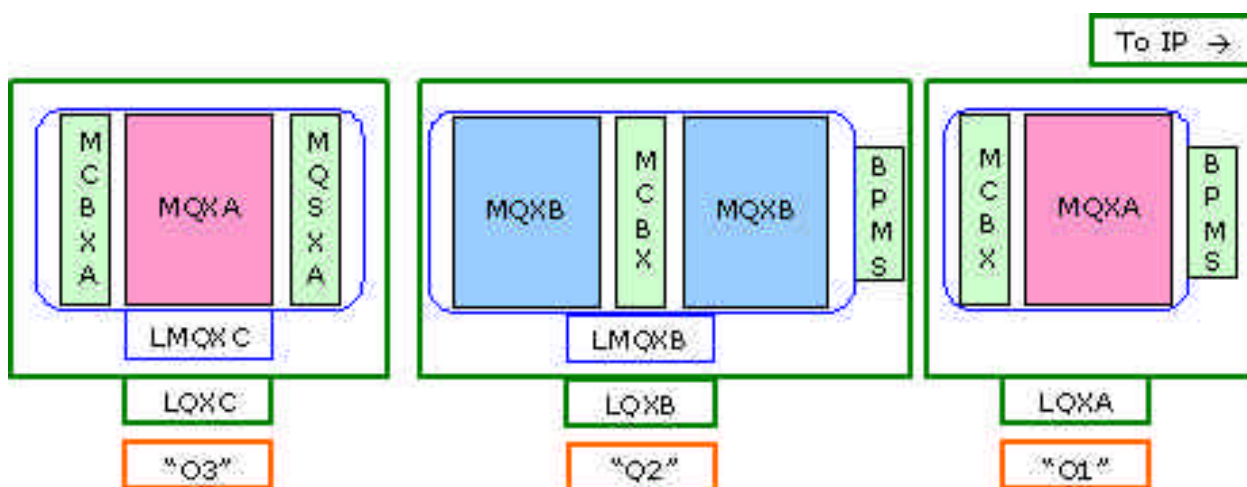


Figure 1. Layout of one side of an interaction point showing assembly packages

2. MQSXA INTERFACES

2.1 MECHANICAL

The MQSXA corrector package has a mechanical envelope and mass as defined in [3]. The quadrupole package is located at the flange end of the assembly; the OD of the flange will be 250mm; 4 15mm through holes at ± 45 degrees from vertical and at a diameter of 215mm will be provided in the flange. The M8 lifting holes shown on the top of the outer cylinder in [3] are located 107 and 435 mm from the mounting ring. This envelope is consistent with the volume provided in the LMQXC assembly, and the flange shown on the corrector outer cylinder mates with the attachment element used to connect the corrector to the LMQXC assembly.

A minimum 70mm bore provides adequate clearance for insertion of a beam tube during final assembly.

2.2 ELECTRICAL

The MQSXA is provided to Fermilab with two 600A leads for the mqsx winding extending from the flange end of the package, and six 120 A leads from the non-flange end of the package for the 3 higher order correctors. CERN will provide the leads out to the current lead connection box attached to each unit. The leads are labeled A and B in accordance with CERN specification [4].

Each layer of the MQSXA comes with a single voltage tap attached to the "A" lead, for diagnostic purposes. (The voltage taps on the "B" lead and at the coil center, shown in [3] for each layer, will be removed before the MQSXA is shipped to Fermilab.) The corrector unit will be delivered with 10m of 26 gauge wire for each of these taps [5].

There are no temperature sensors or quench heaters associated with these units.

2.3 ALIGNMENT

Alignment information for the quadrupole layer is transmitted in rotation by an alignment grooves that will be located on the exterior surface of the cylinder at the non-flange end, and confirmed by an additional groove in the flange itself. The grooves in the cylinder at the non-flange end define the 'vertical' axis of the assembly, while that in the flange is rotated 90 degrees and shows the horizontal plane. For position of the axis, the outer cylinder of the corrector element is concentric with the beam axis.

3. REFERENCES

- [1] INNER TRIPLET SYSTEMS AT IR1, 2, 5, AND 8, CERN Functional Specification LHC-LQX-ES-0001.00
- [2] TECHNICAL SPECIFICATION FOR THE SUPPLY OF SUPERCONDUCTING CORRECTOR MAGNET ASSEMBLIES MQSXA FOR THE INNER TRIPLETS OF THE LARGE HADRON COLLIDER, CERN Specification LHC-MQSX-CI-0001
- [3] CERN drawing LHCMQSXA0020.
- [4] LHC MAGNET POLARITIES, CERN Specification LHC-DC-ES-0001
- [5] INSTRUMENTATION WIRES, CONNECTION TECHNIQUES AND FEEDTHROUGHS FOR THE LHC CRYOMAGNETS AND THE QRL, CERN Specification LHC-QI-ES-0001